Remarks

In view of the following remarks, reconsideration of the rejections and further examination are requested.

Claims 1, 3-12 and 14-16 are pending in this application and stand rejected.

Claims 1, 3-12 and 14-16 have been rejected under 35 U.S.C.§ 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which the Applicants regard as the invention. Specifically, the Examiner asserts that "high carbon" as recited in claim 1 is relative, and it is unclear what content of carbon is considered to be "high carbon." The Applicants respectfully traverse these rejections.

The Applicants respectfully submit that the term "high-carbon chrome bearing steel," as recited in claim 1, is definite and is well-known in the art. Specifically, the Applicants would like to direct the Examiner's attention to the attached copy of JIS (Japanese Industrial Standard) G-4805 published in 1999. JIS G-4805 defines the composition of "high-carbon chromium bearing steel" as containing quantities of Carbon (C), Silicon (Si), Maganese (Mn), Phosphorus (P), Sulfur (S), Chromium (Cr) and Molybdenum (Mo). Thus, JIS G-4805 particularly defines "high-carbon chrome bearing steel" such that it is definite. Moreover, one of ordinary skill in the art at the time the present invention was made would have understood what the term "high-carbon chromium bearing steel" comprised. Thus, the term "high-carbon chromium bearing steel" was and is a term that is well-known in the metals manufacturing art.

Accordingly, the Applicants respectfully request withdrawal of the 35 U.S.C. § 112, second paragraph, rejections.

Claims 1, 4 and 8 have been rejected under 35 U.S.C. § 102(b) as being anticipated by Takagi et al. (U.S. Patent No. 5,560,787) (hereinafter referred to as "Takagi"). Claims 3, 7 and 9 have been rejected under 35 U.S.C. § 103(a) as being unpatentable over Takagi in view of Yoshida et al. (U.S. Patent No. 5,803,993) (hereinafter referred to as "Yoshida"). Claims 5, 6, 10, 12, 15 and 16 have been rejected under 35 U.S.C. § 103(a) as being unpatentable over Takagi in view of Fredericksen et al. (U.S. Patent No. 4, 878,463) (hereinafter referred to as "Fredericksen"). Claims 11 and 14 have been rejected under 35 U.S.C. 103(a) as being unpatentable over Takagi in view of Yoshida and further in view of Fredericksen. The

Applicants respectfully traverse and request withdrawal of these rejections for the following reasons.

With exemplary reference to the figures, claim 1 sets forth a roller bearing 1 including an inner ring 5 and an outer ring 6 made of a high-carbon chrome bearing steel, a carburized steel or a carbon steel for mechanical structures, and a plurality of rolling elements 7 mounted between the inner ring 5 and the outer ring 6, wherein at least one of the inner ring 5 and the outer ring 6 is subject to a heat treatment comprising, in order, carbonitriding, oil quenching and induction hardening such that a surface layer of the at least one of the inner ring 5 and the outer ring 6 has a compressive strength of not less than 200 MPa, and a tempering hardness at 500° C of not less than Hv 550.

Thus, claim 1 requires a roller bearing including, in part, an inner ring and an outer ring made of high-carbon chrome bearing steel, a carburized steel or a carbon steel for mechanical structures. Carburized steel is a term that is well-known in the art and is also known as "wrought case-hardening steel." JIS G-7503 (attached herewith), defines the composition of wrought case-hardening steel as including Carbon (C), Silicon (Si), Manganese (Mn), Phosphorus (P), Sulfur (S), Chromium (Cr), Molybdenum (Mo) and Nickel (Ni). Carbon steel for mechanical structures is also a term that is well-known in the art. JIS G-4051 (attached herewith) defines the composition of carbon steel for mechanical structures as including Carbon (C), Silicon (Si), Manganese (Mn), Phosphorus (P) and Sulfur (S).

Takagi discloses a roller bearing for use in a high temperature environment such as in a jet engine. The bearing is made of high-speed steel to prevent softening of the bearing during rotation and so that the bearing can withstand tensile stresses resulting from centrifugal forces during rotation. The compositions of the high-speed steels disclosed in Takagi are illustrated in Table 1 which is located beneath columns 5 and 6 of Takagi.

In contrast to the present invention, Takagi does not disclose that the high-speed steels listed in Table 1 of Takagi have the same composition as any of "high-carbon chromium bearing steel," "carburized steel" or "carbon steel for mechanical structures," as these terms are known in the art as described above. Instead, as illustrated in Table 1, Takagi discloses that these high-

speed steels are comprised of various quantities of Carbon, Silicon, Maganese, Chromium, Molybdenum, as well as Tungsten (W), Vanadium (V), Cobalt (Co) and Nickel (Ni).

By comparing the composition of the high-speed steels of Takagi against the compositions of the steels recited in claim 1, it can be seen that the high-speed steels of Takagi contain large amounts of W and V and may contain large amounts of Cr, whereas the recited steels do not contain W and V, and contain at most very little Cr. Moreover, in the metal manufacturing art, high-speed steel is not ordinarily considered to be a "bearing steel," while the steels recited in claim 1 are ordinarily considered to be "bearing steels." The Examiner asserts that the steel of Takagi satisfies all of the claimed physical structure. However, as discussed above, the high-speed steels disclosed in Takagi do not have the same composition as the steels recited in claim 1. Thus, they do not have the same physical structure.

Furthermore, there is no suggestion or disclosure in Takagi to modify the compositions of the high-speed steels listed in Table 1 such that they constitute any of the steels recited in claim 1. In other words, Takagi does not disclose a roller bearing including an inner ring and outer ring made of a high-carbon chrome bearing steel, a carburized steel or a carbon steel for mechanical structures, as recited in claim 1.

The Examiner cited the Yoshida reference for disclosing a steel with a prior austenite grain diameter within the claimed range of 10 or more for the purpose of obtaining desired torsional fatigue strength and steel having a hardness of greater than 720 Hv and surface compressive stress of 850 MPa. Yoshida discloses an outer ring used for a high strength constant velocity joint that contains: 0.45 to 0.53% Carbon; 0.05 to 0.25% Silicon; 0.7 to 1.0% Manganese; 0.01 to 0.05% Aluminum (Al); 0.2 to 0.4% Molybdenum; 0.003 to 0.012% Nitrogen (N); and Iron (Fe) and inevitable impurities. The impurities include 0.05% or less than 0.05% of Chromium, 0.015% or less than 0.015% Phosphorus; 0.01% or less than 0.01% Sulfur, and 0.002% or less than 0.002% Oxygen (O). (Col. 2, lines 4-16).

By comparing the composition of the steel used in Yoshida against the steels recited in claim 1, it can be seen that Yoshida's steel contains Al, N, Fe and O, whereas the recited steels do not contain Al, N, Fe and O. Consequently, the steel disclosed in Yoshida does not have the same composition as the steels recited in claim 1. Thus, Yoshida's steel and the steels recited in

claim 1 do not have the same physical structure. Moreover, it is clear that Yoshida fails to disclose or suggest a roller bearing including an inner ring and outer ring made of a high-carbon chrome bearing steel, a carburized steel or a carbon steel for mechanical structures, as recited in claim 1. Therefore, Yoshida fails to address the deficiencies of Takagi.

The Fredericksen reference was cited by the Examiner for disclosing a needle roller bearing arranged in a full complement arrangement for the purpose of having a bearing on which the loading is distributed, reducing valve train friction, increasing edge of performance, liability and life expectancy of a rocker arm, lower cost and to allow easy installation. However, Fredericksen also fails to disclose or suggest a roller bearing including an inner ring and outer ring made of a high-carbon chrome bearing steel, a carburized steel or a carbon steel for mechanical structures, as recited in claim 1. Therefore, Fredericksen also fails to address the deficiencies of Takagi.

For at least the reasons set forth above, it is believed clear that claim 1, and claims 3-12 and 14-16 depending therefrom, are not anticipated by Takagi. Further, it is submitted that there is no teaching or suggestion in the prior art of record that would have caused an ordinary artisan to modify the prior art applied by the Examiner in such a manner as to result in, or otherwise render obvious, the invention of claim 1. Therefore, it is submitted that claims 1, 3-12 and 14-16 are clearly allowable over the prior art of record.

In view of the foregoing amendments and remarks, all the claims now active in this application are believed to be in condition for allowance. Reconsideration and favorable action are respectfully solicited.

Should the Examiner believe there are any remaining issues that must be resolved before this application can be passed to issue, it is respectfully requested that the Examiner contact the undersigned by telephone in order to resolve such issues.

Respectfully submitted,

Kikuo MAEDA

By: 

Kevin McDermott
Registration No. 48,113
Attorney for Applicant

KM/CRW/km
Washington, D.C. 20006-1021
Telephone (202) 721-8200
Facsimile (202) 721-8250
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